

<110> Organization Name : Carlsberg A/S

Application Project

<120> Title : Barley for production of flavor-stable beer

<130> AppFileReference : 1

<140> CurrentAppNumber :

<141> CurrentFilingDate : ____-__-__

Sequence

<213> OrganismName : Hordeum vulgare cv. Barke

<400> PreSequenceString :

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<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 1

SequenceDescription : Barley genomic sequence of cv. Barke,
spanning

the start and stop codons of the gene encoding LOX-1

Sequence

<213> OrganismName : Hordeum vulgare mutant D112

<400> PreSequenceString :

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<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 2

SequenceDescription : Barley genomic sequence of mutant D112 spanning the segment, corresponding to the region between the start and stop codons of the gene encoding LOX-1 of cv. Barke

Sequence

<213> OrganismName : Hordeum vulgare cv. Barke

<400> PreSequenceString :

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EFLLLTITLH DVPGRSGNLT FVANSWIYPA ANYRYSRVFF ANDTYLPSQM PAALKPYRDD 180
ELRNLRGDDQ QGFYQEHDR IYRYDVYNDLG EGRPIILGNS DHPYFRRGR ERKPNASDPS 240
LESRLSLEQL IYVPRDEKFG HLKTSDFLGY SIKAITQGIL PAVRTYVDTT PGEFDSFQDI 300
INLYEGGIKL PKVALEELR KQFPLQLIKD LLPVGGDSLL KLPVPHIIQE NKQAWRTDEE 360
FAREVLAGVN PVMITRLTFE PFKSSLDPSK FGDHTSTITA EHIEKNLEGL TVQQALESNR 420
LYLIDHHRDF MPFLIDVNNL PGNFIYATRT LFFLRGDGRL TPLAIELSEP IIQGGLTAK 480
SKVYTPVPSG SVEGWVWELA KAYVAVNDG WHQLVSHWLN THAVMEPFVI STNRHLSVTH 540
PVHKLLSPHY RDTMTINALA RQTLINAGGI FEMTVFFPGKF ALGMSAVVYK DWKFTEQGLF 600
DDLKRGMAV EDPSSPYKVR LLVSDYPYAA DGLAIWHAIE QYVSEYLAII YPNDGVQLGD 660
TEVQAWKET REVGHGDLKD APWWPKMQSV PELAKACTTI IWIGSALHAA VNFQGYFYAG 720
FLPNRPTVSR RRMPEPGTEE YAELEDFER AFIHITSQI QTIIGVSLLE VLSKHSSDEL 780
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<212> Type : PRT

<211> Length : 862

SequenceName : SEQ ID NO: 3

SequenceDescription : Protein sequence of full-length LOX-1 protein of cv. Barke

Sequence

<213> OrganismName : Hordeum vulgare mutant D112

<400> PreSequenceString :

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EFLLLTITLH	DVPGRSNLT	FVANSWIYPA	ANYRYSRVFF	ANDTYLPSQM	PAALKPYRDD	180
ELRNLRGDDQ	QGPYQEHDR	YRYDVYNDLG	EGRFILGGNS	DHPYPRRGRT	ERKFNASDPS	240
LESRLSLLEQ	IYVPRDEKFG	HLKTSDFLGY	SIKAITQGLL	FAVRTYVDTT	PGFEFDSFQDI	300
INLYEGGIKL	PKVAALEELR	KQFPLQLIKD	LLPVGGDSL	KLPVPHIIQE	NKQAWRTDEE	360
FAREVLAGVN	PVMITRLTEF	PPKSSLDPSK	FGDHTSTITA	EHIEKNLEGL	TVQQALESNR	420
LYILDHHDRL	MFPLIDVNNL	PGNFIYATRT	LFLLRGDGRL	TPLAIELSEP	IIQGGLTTAK	480
SKVYTFVPVG	SVEGWVWELA	KAYVAVNDSG	WHQLVSHWLN	THAVMEPFVI	STNRHLSVTH	540
PVHKLLSPHY	ROMTINALA	RQTLINAGGI	FEMTVFPKGF	ALGMSAVVYK	DWKEFTEQGLP	600
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<212> Type : PRT

<211> Length : 665

SequenceName : SEQ ID NO: 4

SequenceDescription : Protein sequence of inactive,

truncated LOX-1 of mutant D112

Sequence

<213> OrganismName : Hordeum vulgare cv. Neruda

<400> PreSequenceString :

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atcgacggca	tcggcgagtt	cctcggaacg	ggcgctacct	gccagcttat	cagctccacc	180
gcgcctgacc	aaggtaatca	ctaccctcct	cgggccttct	cctctgttta	caagatatag	240
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```

cggtgatgga gcggttctgt atctcgacga accggcacct tagcgtgacg caccgggtgc 3120
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catccccaac agcatctcca tctaa 4165

```

<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 5

SequenceDescription : Barley genomic sequence of cv. Neruda
spanning the start and stop codons of the gene encoding LOX-1

Sequence

<213> OrganismName : Hordeum vulgare mutant A618

<400> PreSequenceString :

```

atgtctgtcg gagggctgat cgacaccctc acggggggcga acaagagcgc ccgctcaag 60
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atcgacggca tcggcgagtt cctcggcaag ggctgcacct gccagcttat cagctccacc 180
gcgctogacc aaggtaatca ctaccctcct ccggccttct cctctgttta caagatatag 240
tattctcttc gtgtgggccc gcggccatgg atggatggat gtgtctggat cggctaaaga 300
agataggata gctagccctg gccggctgct tttacctgag catgggcata tgccatcgaa 360
aaaagagaca acagcatgca tgcattggtc gcgcaccaga ccacgcagag caccggatgc 420
tcgagacaaa gcaacacaa aagcaaggac gacacgtcaa aagcaacaca acaagcaagg 480
acggcagctc aaaagcaaca caaacctaaa ctaaagcaca aagacgtaag agcaagcaca 540
caatcagcag gctataaaca gttgtcatca aaaacaacgc tggaagagag agagaaggaa 600

```

ggaagtagta	gccatgaaaa	attaaatcac	cgggcggttc	tctttgccca	acaattaatc	660
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tacgtggtgg	tgcagacaac	ggcggtcgcg	ggaaggtggg	cgcggaggcg	gagctggagc	780
agtgggtgac	gagcctgcgc	tcgctgacga	cgggggagtc	caagttcggc	ctcaccttcg	840
actgggagg	ggagaagctc	ggggtgcgcg	gcgccatcgt	cgtcaacaa	taccacagct	900
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```

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catccccaac agcatctcca tctaa 4165

```

<212> Type : DNA

<211> Length : 4165

SequenceName : SEQ ID NO: 6

SequenceDescription : Barley genomic sequence of mutant A618, spanning the segment corresponding to the region between the start and stop codons of the gene encoding LOX-1 of cv. Neruda

Sequence

<213> OrganismName : Hordeum vulgare cv. Neruda

<400> PreSequenceString :

```

MLLGLIDTL TGANKSARKL GTVLMRKNV LDLNDFGATI IDGIGEFLLK GVTCQLISST 60
AVDQDNNGRG KVGAEAELEQ WVTSLPSLTT GESKFLTFD WEVEKLGVPK AIVVNNYHSS 120
EFLKLTITLH DVPGRSGNLT FVANSWIYPA ANYRYSRVFF ANDTYLPSQM PAALKPYRDD 180
ELRNLRGDDQ QSPYQEHDR IYRDVYNDLG EGRPILGNS DHPYPRRGRT ERKFNASDPS 240
LESRLSLEQ IYVPRKEFG HLKTSDFLGY SIKAITQGL PAVRTYVDTT PGEFDSFQDI 300
INLYEGGKIL PKVAALEELR KQFPLQLIKD LLPVGGDSL KLPVPHIIQE NKQAWRTDEE 360
FAREVLAGVN PVMITRLTFE PPKSSLDPSK FGDHTSTITA EHIEKNLEGL TVQQALESNR 420

```

```

LYILDHHRDF MPFLIDVNNL PGNFYIATRT LFFLRGDGRL TPLAIELSEP IIQGGLTTAK      480
SKVYTFVPSG SVEGWVWELA KAYVAVND SG WHQLVSHWLN THAVMEPFVI STNRHLSVTH      540
PVHKLLSPHY RDTMTINALA RQFLINAGGI FEMTVFFGKF ALGMSAVVYK DWKFTQGLP      600
DDLKRGMAV EDPSSPYKVR LLVSDYPYAA DGLAIWHAIE QYVSEYLAII YPNDGVLQGD      660
TEVQAWWKET REVGHGDLKD APWWPKMQSV PELAKACTTI IWIGSALHAA VNFQOYPYAG      720
FLPNRPTVSR RRMPEPGTEE YAELEDFER AFIIHTITSQI QTIIGVSLLE VLSKHSSDEL      780
YLGQRDTPFW TSDPKALEVF KRFSDRLVEI ESKVVGMMND PELKNRNGPA KFPYMLLYPN      840
TSDHKGAAG LTAKGIFNSI SI                                                    862

```

<212> Type : PRT

<211> Length : 862

SequenceName : SEQ ID NO: 7

SequenceDescription : Protein sequence of full-length

LOX-1 protein of cv. Neruda

Sequence

<213> OrganismName : Hordeum vulgare mutant A618

<400> PreSequenceString :

```

MLLGGLIDTL TGANKSARLK GTVVLMRKNV LDLDNFGATI IDGIGEFGLK GVTCQLISST      60
AVDQDNGGRG KVGAEAELEQ WVTSLPFLTT GESKFLGTFD WEVEKLGVPF AIVVNNYHSS      120
EFLKLTITLH DVPGRSGNLT FVANSWIYPA ANYRYSRVFF ANDTYLPSQM PAALKPYRDD      180
ELRNLRGDDQ QGFPYQEHRI YRYDVYNDLG EGRFILGNS DHFYPRRGRT ERKFNASDPS      240
LESRLSLEQG IYVPRDEKFG HLKTSDFLGY SIKAITQGIL FAVRTYVDTT PGEFDSFQDI      300
INLYEGGIKL PKVAALEELR KQFPLQLIKD LLPVGGDSLL KLPVPHIIQE NKQAWRTDEE      360
FAREVLAGVN PVMITRLTMS QRLFVHCVCV VSMVRKCRS                               399

```

<212> Type : PRT

<211> Length : 399

SequenceName : SEQ ID NO: 8

SequenceDescription : Protein sequence of inactive,

truncated LOX-1 of mutant A618

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

```

gaaagcgagg agaggaggcc aagaacaa                                           28

```

<212> Type : DNA

<211> Length : 28

SequenceName : SEQ ID NO: 9

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

ttattcatcc atggttgccg atggccttaga

30

<212> Type : DNA

<211> Length : 30

SequenceName : SEQ ID NO: 10

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

agggactgcc ggacgatctc a

21

<212> Type : DNA

<211> Length : 21

SequenceName : SEQ ID NO: 11

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

gccagctccg gcacactt

18

<212> Type : DNA

<211> Length : 18

SequenceName : SEQ ID NO: 12

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

```

<400> PreSequenceString :
caaggtgcgg ttgctggtgt c                                21
<212> Type : DNA
<211> Length : 21
      SequenceName : SEQ ID NO: 13
      SequenceDescription : Oligonucleotide primer used for PCR
      amplification (sense primer)

Sequence
-----
<213> OrganismName : Oligonucleotide
<400> PreSequenceString :
ctcgcgcgtc tccttcac                                    19
<212> Type : DNA
<211> Length : 19
      SequenceName : SEQ ID NO: 14
      SequenceDescription : Oligonucleotide primer used for PCR
      amplification (antisense primer) Sequence
-----
<213> OrganismName : Oligonucleotide
<400> PreSequenceString :
ctcgcgcgtc tccttccat                                    19
<212> Type : DNA
<211> Length : 19
      SequenceName : SEQ ID NO: 15
      SequenceDescription : Oligonucleotide primer used for PCR
      amplification (antisense primer)

Sequence
-----
<213> OrganismName : Oligonucleotide
<400> PreSequenceString :
tacgtgcgcg gggacgagaa g                                21
<212> Type : DNA
<211> Length : 21
      SequenceName : SEQ ID NO: 16
      SequenceDescription : Oligonucleotide primer used for PCR
      amplification (sense primer)

```

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

tgatcatgac cgggttgacg t

21

<212> Type : DNA

<211> Length : 21

SequenceName : SEQ ID NO: 17

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

catatgctgc tgggagggct g

21

<212> Type : DNA

<211> Length : 21

SequenceName : SEQ ID NO: 18

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

gaattcttag atggagatgc tgttggg

27

<212> Type : DNA

<211> Length : 27

SequenceName : SEQ ID NO: 19

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

ctaccgcgtac gcggcggaac ggct

24

<212> Type : DNA

<211> Length : 24

SequenceName : SEQ ID NO: 20

SequenceDescription : Oligonucleotide primer used for PCR
amplification (sense primer)

Sequence

<213> OrganismName : Oligonucleotide

<400> PreSequenceString :

tcctgaattc acgctgcac ctccgtatcg c

31

<212> Type : DNA

<211> Length : 31

SequenceName : SEQ ID NO: 21

SequenceDescription : Oligonucleotide primer used for PCR
amplification (antisense primer)